

Integrated planning and operational tools for emergency evacuation traffic management: case studies and system application in Washington DC Metropolitan Area (March 29th, Tuesday, 2011 at Argonne)

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ABSTRACT

The evacuation of large municipal areas in an efficient manner during emergencies and disasters is one of the critical tasks faced by emergency management agencies. This talk will present tools for emergency evacuation planning and real-time operations as well as case studies in Washington, D.C. metropolitan area. The developed tools feature a GIS-based platform that can effectively integrate various types of evacuation and traffic related information with a set of evacuation optimization models and an intelligent macroscopic simulator. The evacuation optimization models in the proposed system are unique due to their capabilities to determine an appropriate control area within the region for traffic operators to prioritize the limited control resources, and yield the best evacuation control parameters (e.g. traffic routing, signal control) at critical control points in the control area to maximize the total evacuation throughput. A real-time macroscopic traffic simulator is embedded in the system to simulate the evolution of traffic under current and candidate control plans with traffic information predicted and estimated at different time intervals, which enables the system operators to have better understanding of the current and future traffic conditions and compare the operational performance for different control plans. Under hypothetical emergency scenarios in Washington, D.C., the proposed tools demonstrated effectiveness at producing evacuation routing strategies, identifying potential bottlenecks, and evaluating the performance of evacuation operations.

Speaker Bio

Dr. Yue Liu is currently an Assistant Professor of Civil Engineering at the University of Wisconsin -- Milwaukee. He received his Ph.D. in Civil and Environmental Engineering from the University of Maryland – College Park in 2009. His research interests are in the area of traffic operations and control, which includes traffic flow modeling and simulation, traffic signal operations, traffic management under network disruptions, and traffic safety and security. On these topics, he has published over 40 articles in peer-reviewed journals and international conference proceedings. Dr. Liu a member of Emergency Evacuation Subcommittee and a Young member of Freeway Operation Committee of National Transportation Research Board (TRB). He is also on the editorial board for ASCE Journal of Urban Planning and Development.